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(12) **United States Patent**
Hou

(10) **Patent No.: US 9,157,644 B2**
(45) **Date of Patent: Oct. 13, 2015**

(54) **AIR HUMIDIFIER**

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(73) Assignee: **Giftec, LTD**, Sterling, VA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 196 days.

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(22) Filed: **Apr. 30, 2013**

(65) **Prior Publication Data**

US 2013/0300005 A1 Nov. 14, 2013

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/078,815, filed on Apr. 7, 2008, now Pat. No. 8,025,270.

(30) **Foreign Application Priority Data**

May 4, 2012 (CH) 10136112/12

(51) **Int. Cl.**

B01F 3/04	(2006.01)
F24F 6/02	(2006.01)
F24F 6/12	(2006.01)

(52) **U.S. Cl.**

CPC ***F24F 6/02*** (2013.01); ***B01F 3/0407*** (2013.01); ***B01F 3/04021*** (2013.01); ***F24F 6/12*** (2013.01); *Y10S 261/65* (2013.01)

(58) **Field of Classification Search**

CPC B01F 3/04; B01F 3/0407; B01F 3/04007; B01F 3/04021

USPC ..... 261/81, 78.2, 119.1, DIG. 65

See application file for complete search history.

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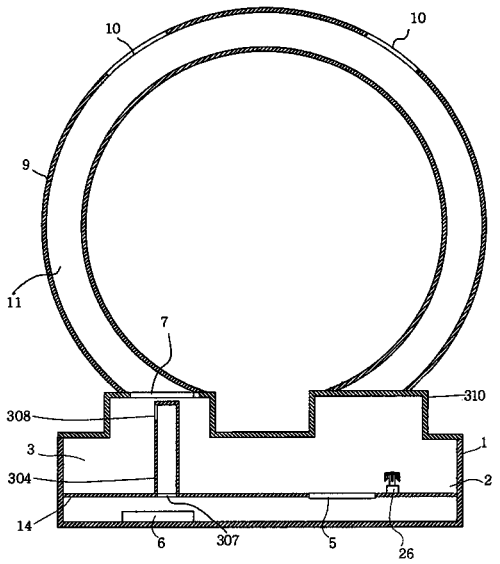
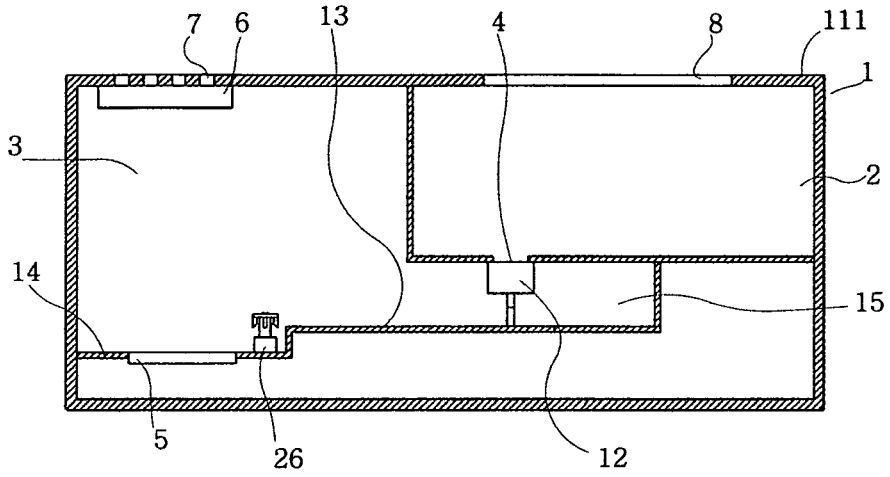
Primary Examiner — Robert A Hopkins

(57) **ABSTRACT**

An air humidifier comprises a base. An opening water tank is integrated into the humidifier base. A water inlet is opening on the upper surface of the casing. The inside of the base is combined with the water tank and an atomizing chamber. The atomizing chamber is composed of a water sub-tank, a water level control board and the bottom of the water tank form a first chamber, A water opening is provided at the bottom of the water tank. A water level control board is provided with a water exit valve corresponding to the water opening. The water exit valve is provided for controlling the flow rate and on/off of the water flow downwardly from the water tank through the water sub-tank. On the water sub-tank is provided with the atomization device and an automatic breaker. The atomization device can be an ultrasonic device or a heater or filter for transforming water into vapor. A fan is installed on the base. A first vapor opening is disposed on the upper surface of the casing.

14 Claims, 16 Drawing Sheets




7
6
13
4
8
111
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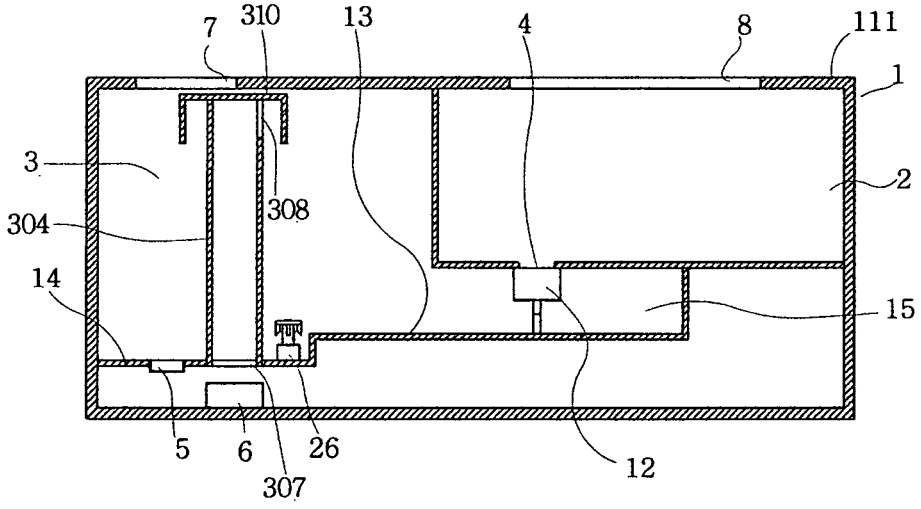
14
15
5
26
12

FIG 1


7
310
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111
1
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308
304
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5
6
26
307
12

FIG 2

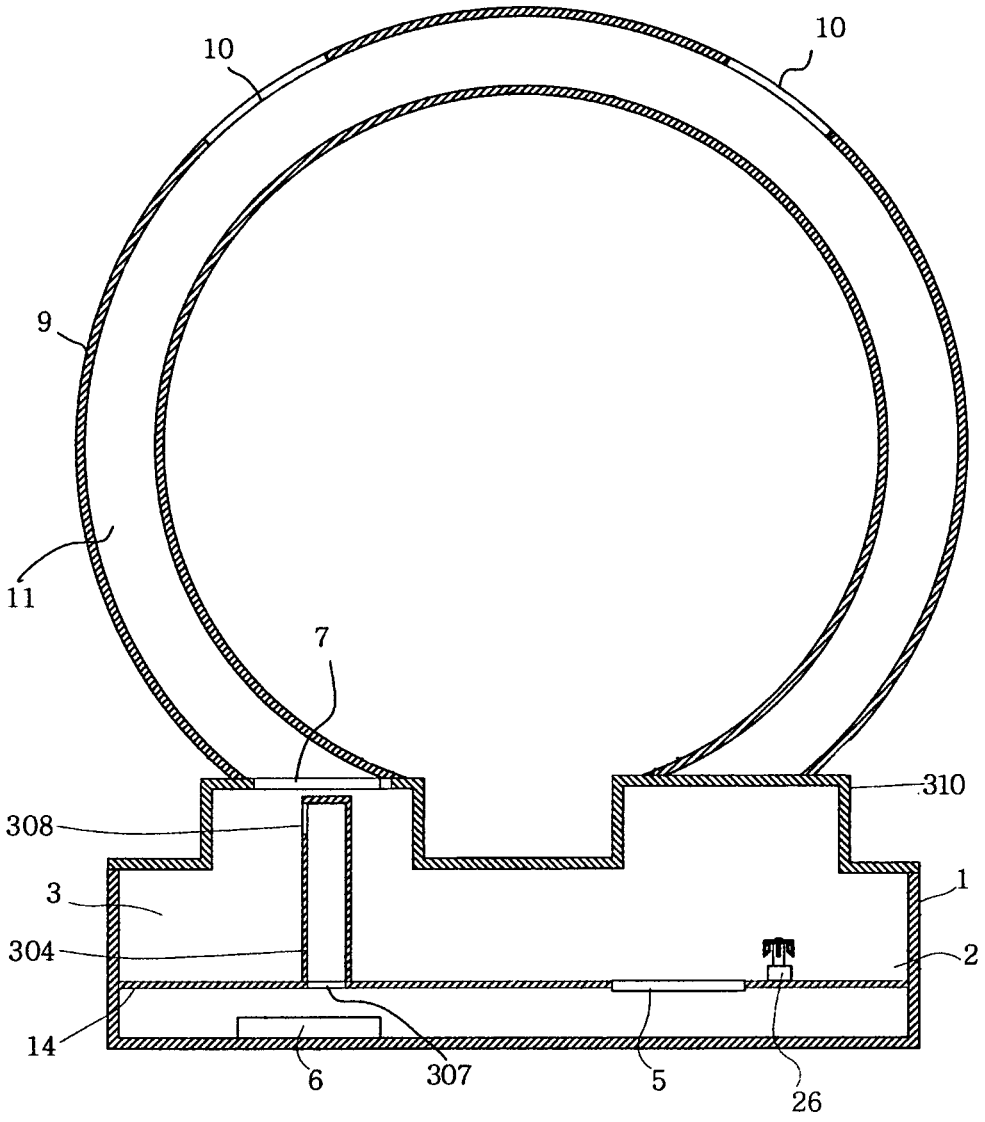

FIG 3

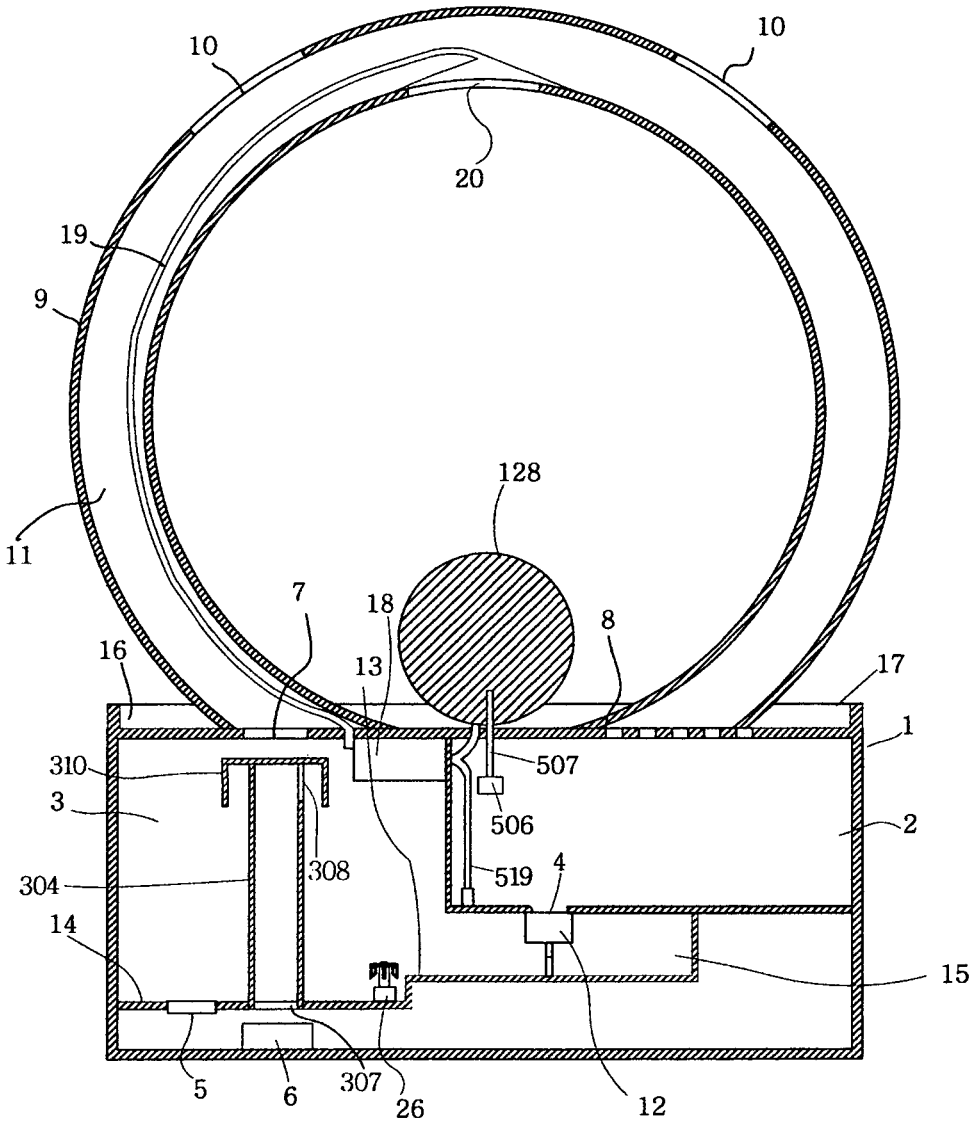
10
10
20
19
9
128
11
7
18
8
16
13
17
1
310
507
3
506
2
308
519
4
304
14
15
5
6
307
26
12

FIG 4

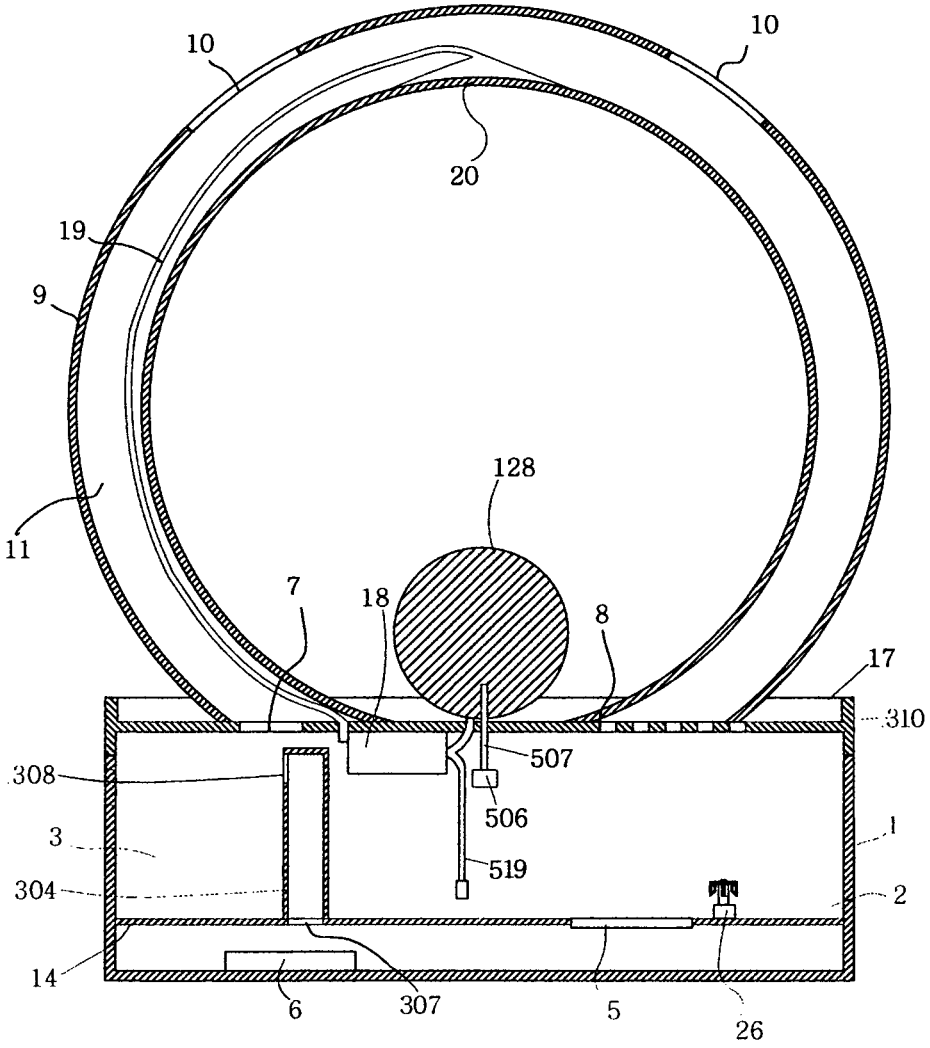
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FIG 5

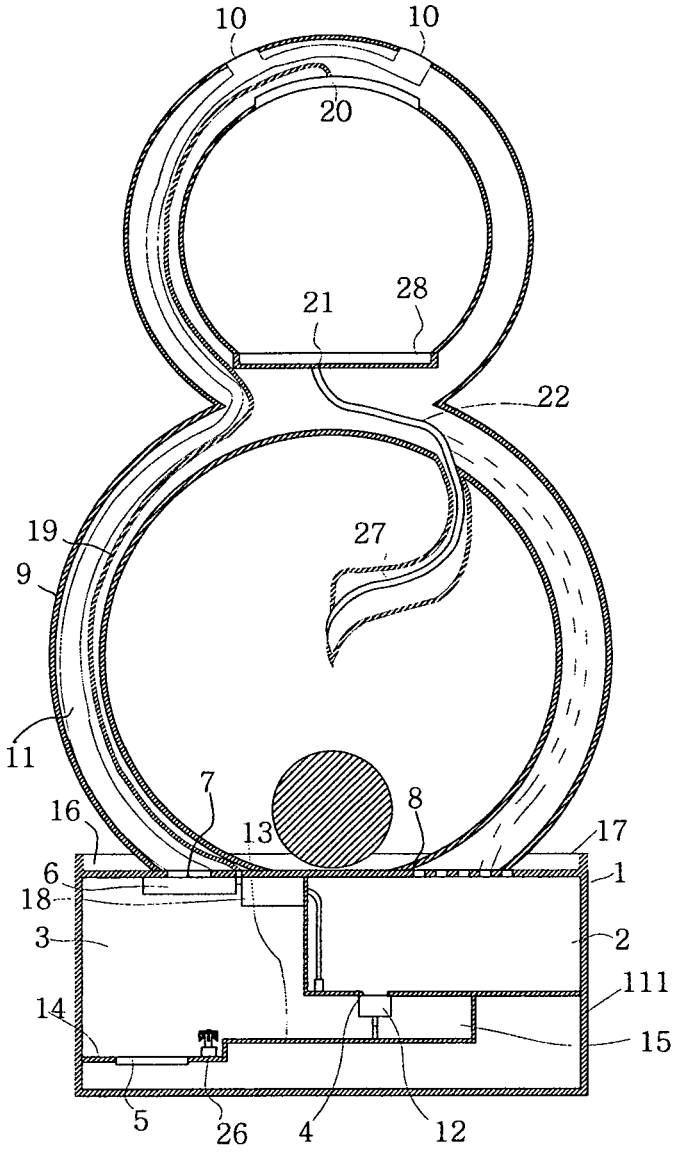


FIG 6

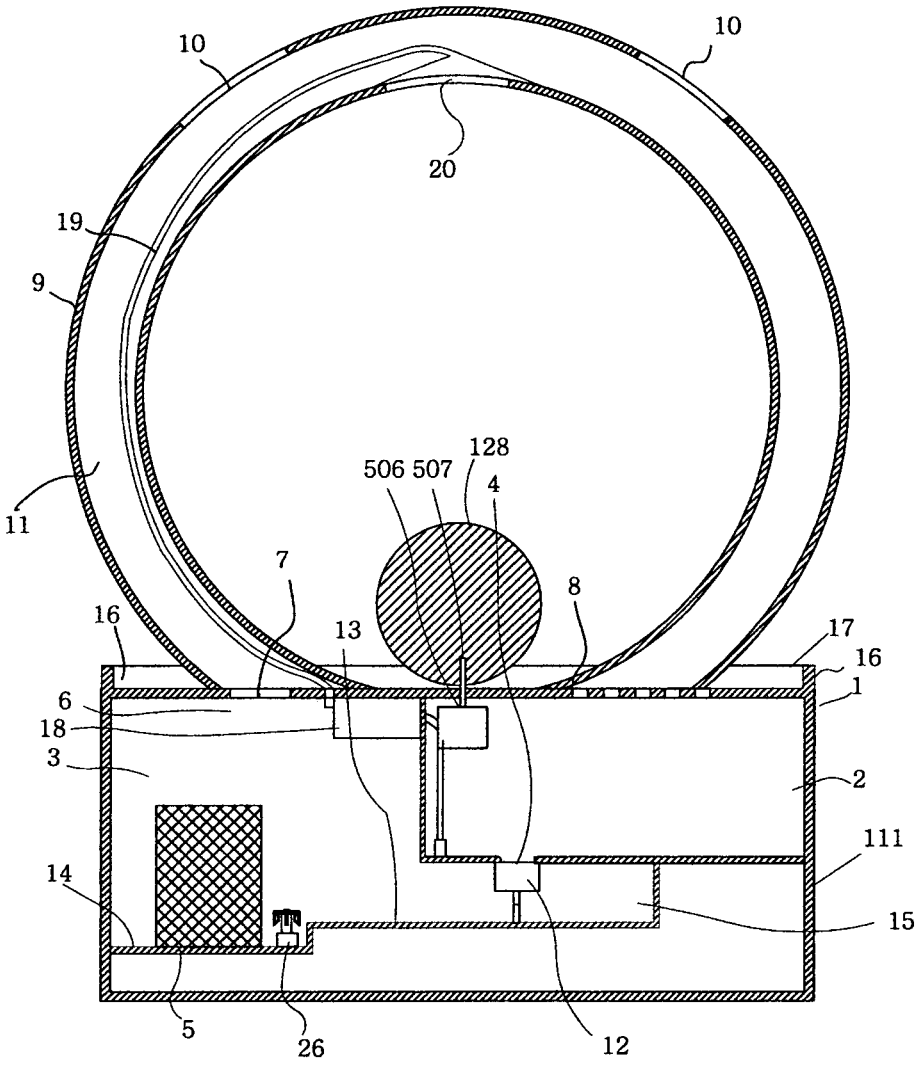
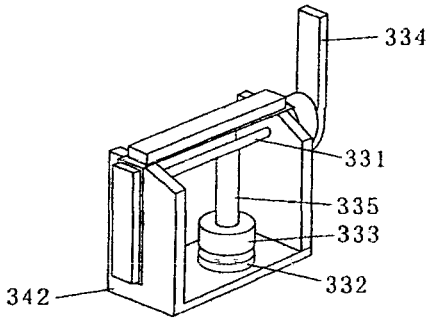


FIG 7



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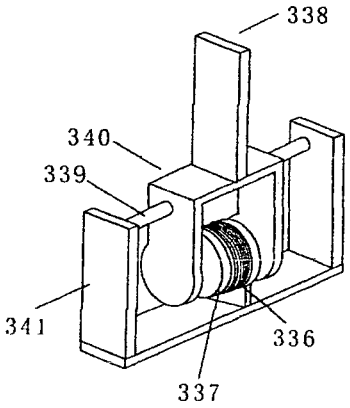


FIG 9

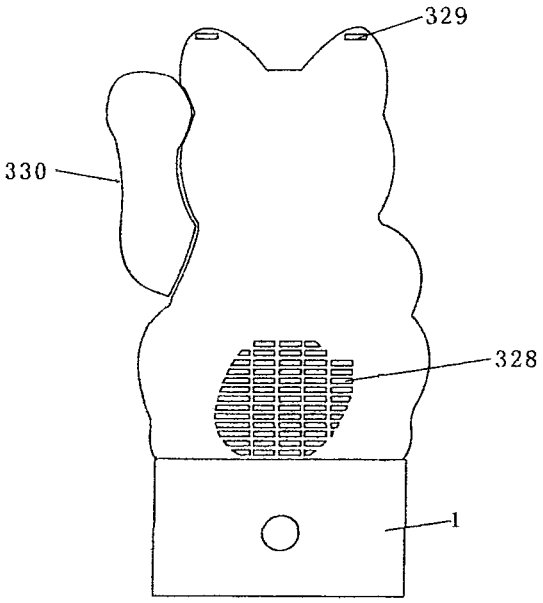


FIG 10

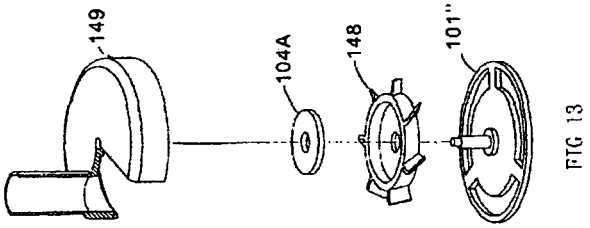


FIG 13

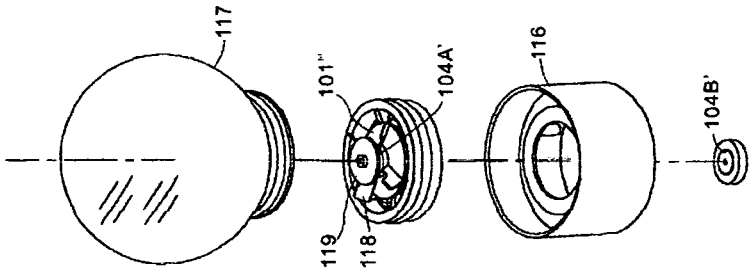


FIG 12

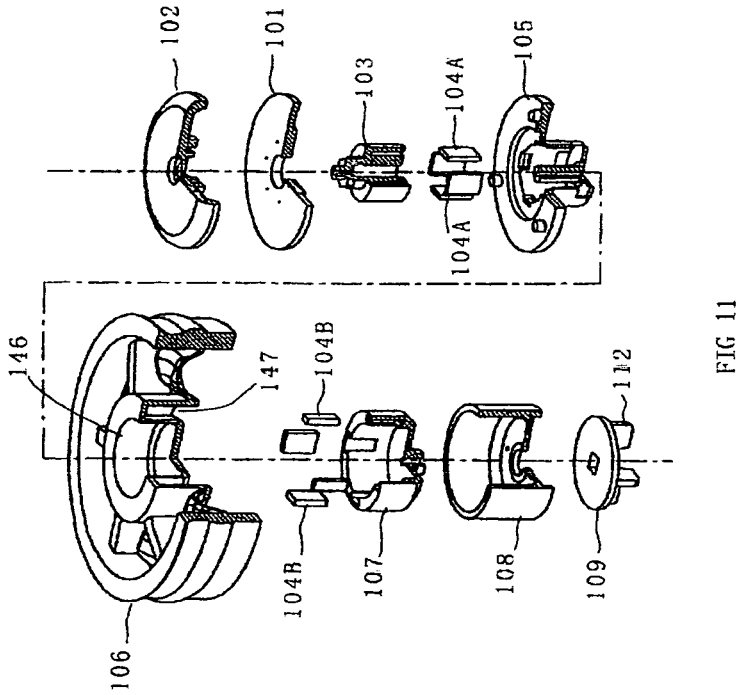


FIG 11

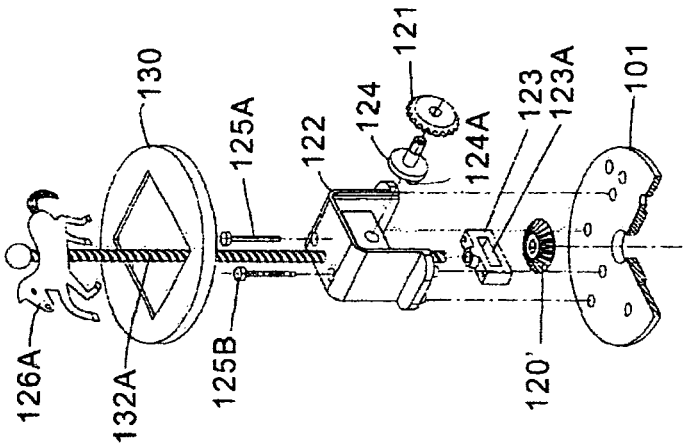


FIG 16

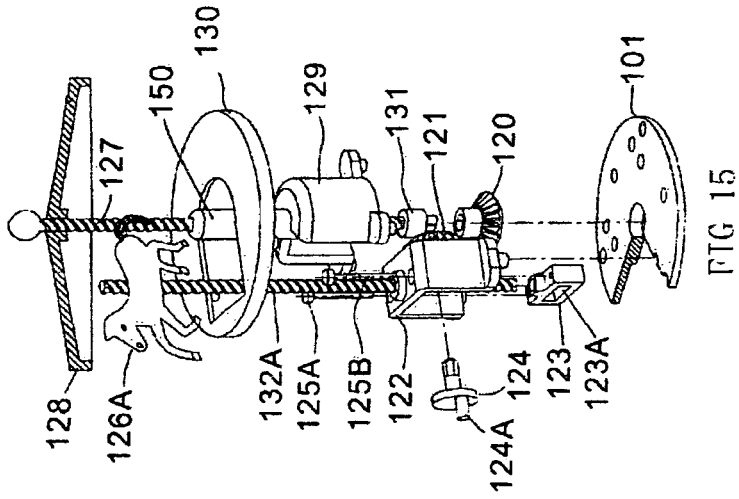


FIG 15

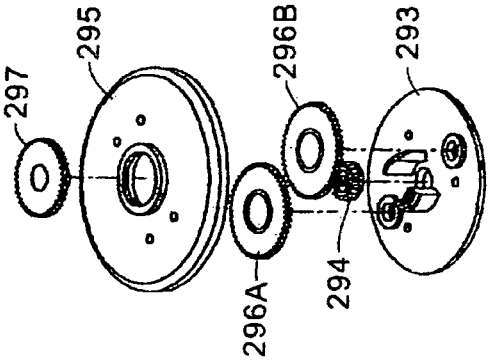
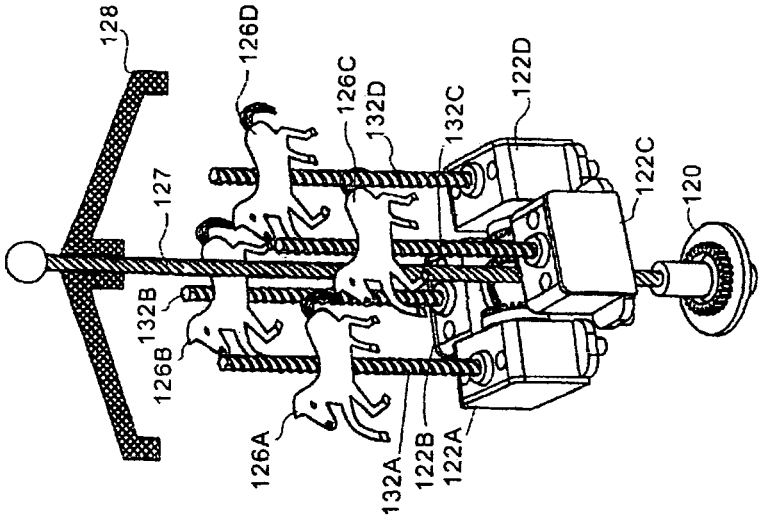


FIG 14



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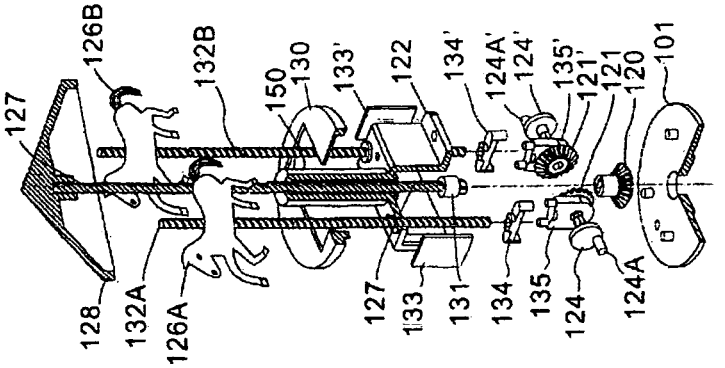

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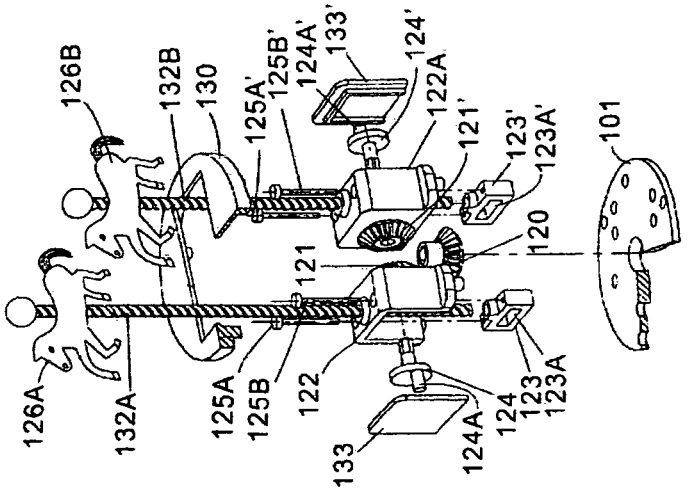


FIG 17

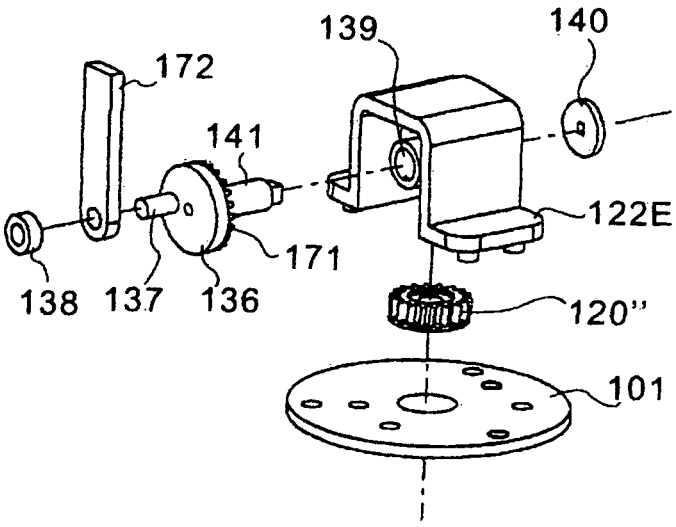

139
140
172
141
122E
171
138
137
136
120"
101

FIG 20

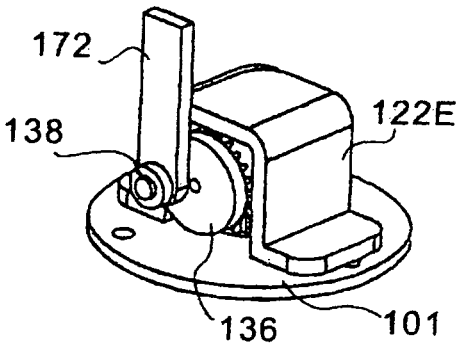

172
122E
138
136
101

FIG 21

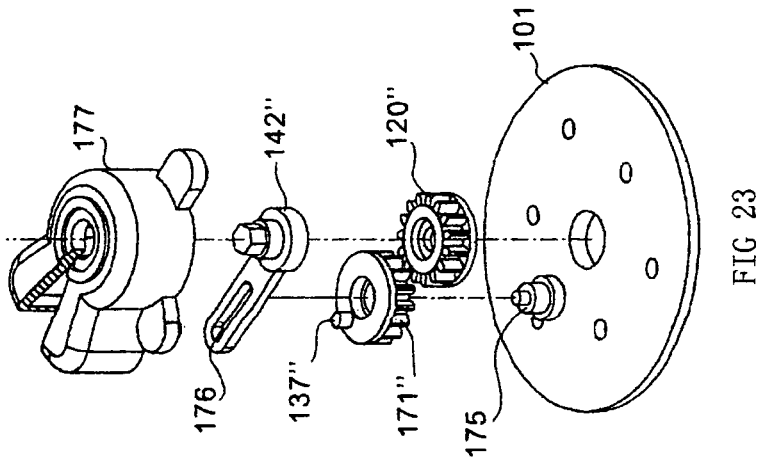

177
142''
120''
101
176
137''
171''
175

FIG 23

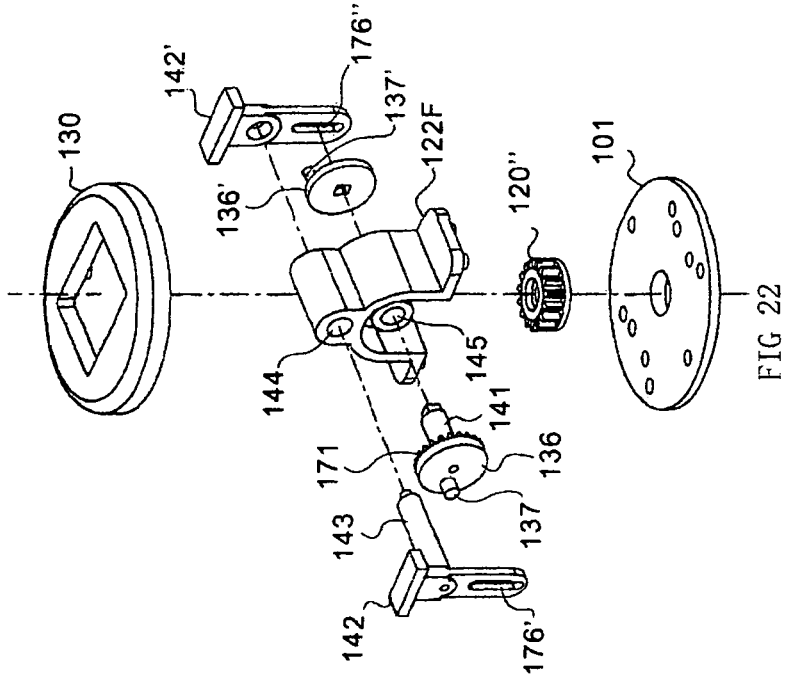

130
142'
176''
137'
122F
136'
120''
101
144
145
141
171
136
143
137
142
176'

FIG 22

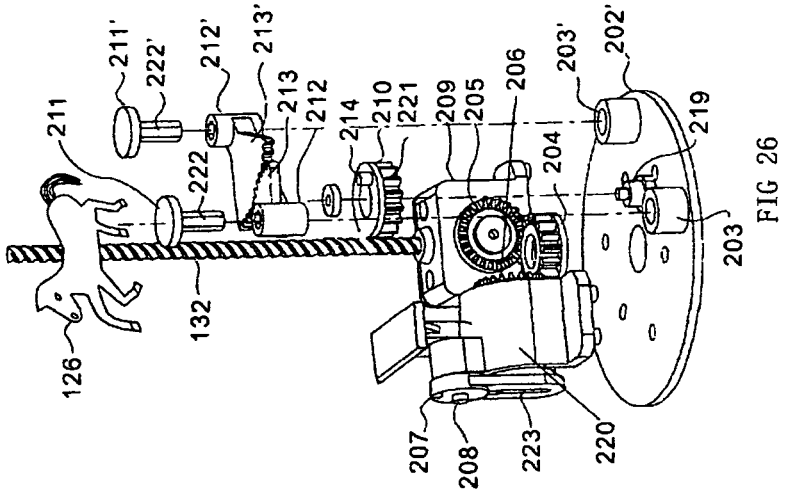


FIG 26

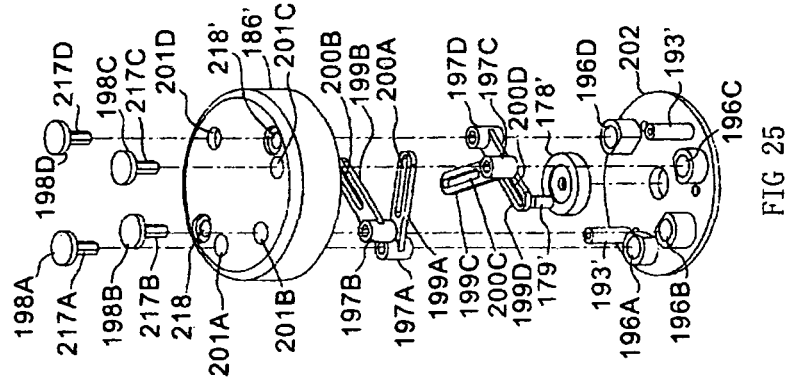


FIG 25

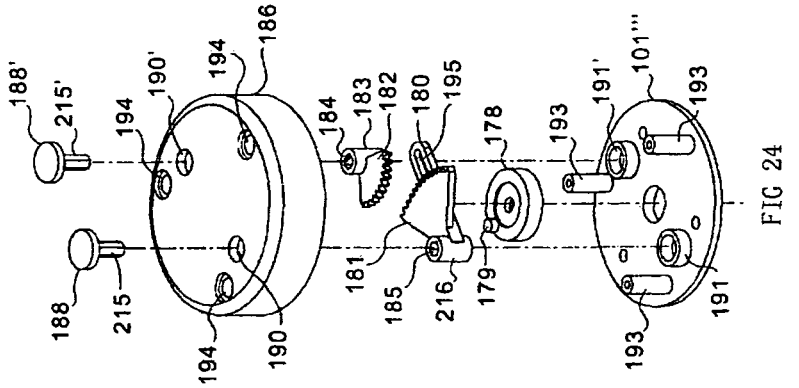


FIG 24

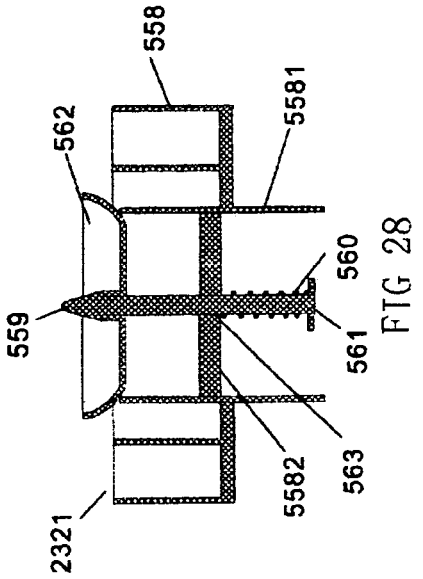

558
5581
562
560
559
561
563
5582
2321

FIG 28

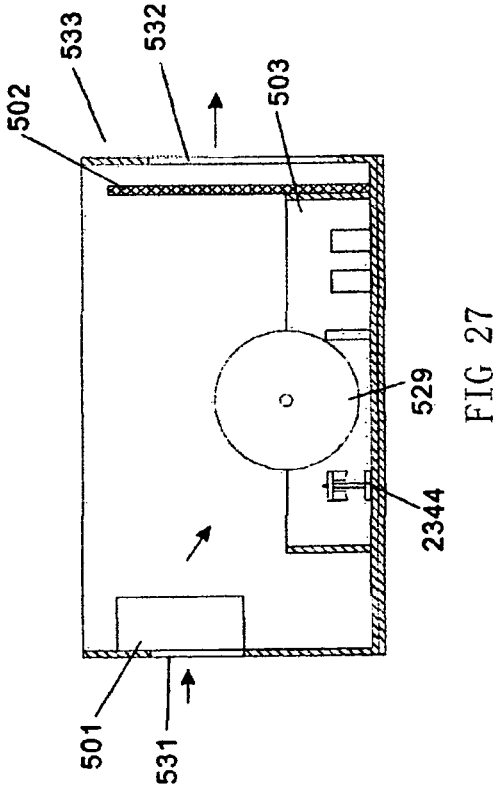
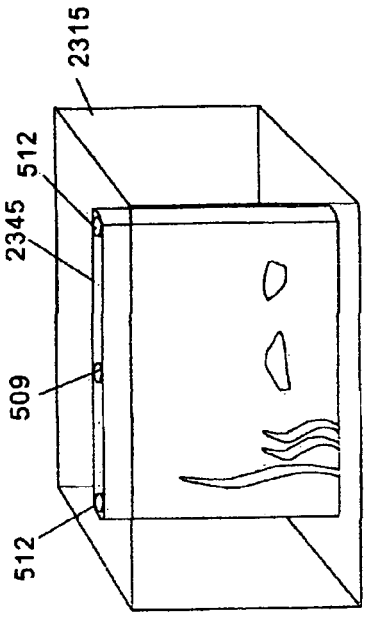

533
532
503
502
529
2344
501
531

FIG 27



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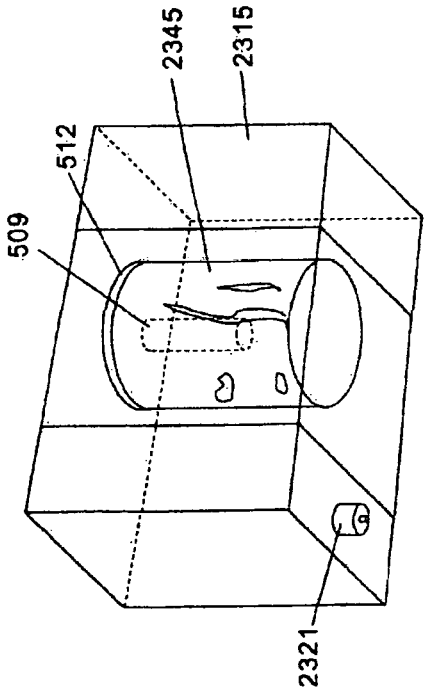

FIG 29

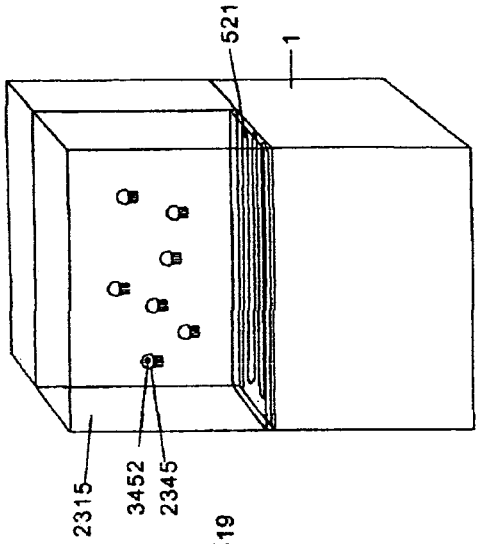

FIG 33

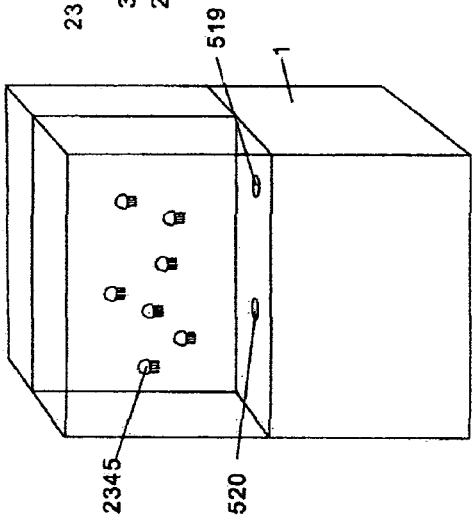

FIG 32

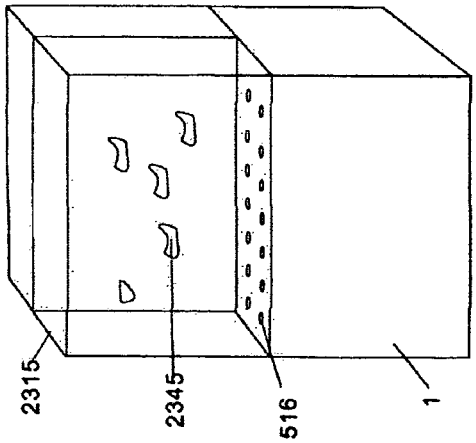

FIG 31

AIR HUMIDIFIER

RELATED APPLICATION

The present application is a continuation in part (CIP) of U.S. application Ser. No. 12/232,396 (incorporated herein by reference, issued as U.S. Pat. No. 8,232,396 on Feb. 12, 2013), and U.S. application Ser. No. 12/232,396 is a CIP of U.S. application Ser. No. 12/078,815 (incorporated herein by reference, issued as U.S. Pat. No. 8,025,270 on Sep. 27, 2011).

FIELD OF THE INVENTION

This invention relates to a humidifier, in particular to a humidifier that can provide a easy to refilled the water (no need to take out water tank), and function of decoration.

BACKGROUND OF THE INVENTION

The conventional humidifiers mostly serve the purpose of humidifying the air or the rooms, and are rarely being decorative.

Various examples of conventional humidifiers or decorative structures are listed in the information disclosure statement.

SUMMARY OF THE INVENTION

The present invention relates to a humidifier that can easy to filled the water and provide a function of decoration, and filtering.

Furthermore, the humidifier of the present invention can provide not only vapor, but also anion to the air or the rooms, and various embodiments of decorations, most of them involve some subassembly or moving mechanisms, can be used in this invention.

The decorative humidifier of the present invention can make anion also be served as an air cleaner.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates an exploded view of the first embodiment of the present invention;

FIG. **2** illustrates an exploded view of the second embodiment of the present invention;

FIG. **3** illustrates an exploded view of the third embodiment of the present invention;

FIG. **4** illustrates an exploded view of the fourth embodiment of the present invention;

FIG. **5** illustrates an exploded view of the fifth embodiment of the present invention.

FIG. **6** illustrates an exploded view of the sixth embodiment of the present invention.

FIG. **7** illustrates an exploded view of the seventh embodiment of the present invention.

FIGS. **8** and **9** illustrates two moving mechanisms used with a decoration shown in FIG. **10**, this structure can also be used with the structures of FIGS. **1-26**;

FIG. **10** illustrates another decoration that can be attached to the humidifier, this structure can also be used with the structures of FIGS. **1-26**;

FIGS. **11**, **12**, . . . , **25**, and **26** illustrate a first, second, . . . , fifteenth, and sixteenth subassembly, respectively, than can be used with the embodiments shown in FIGS. **1-7** and **27-33**;

FIG. **27** is a longitudinal sectional view of a support seat of the embodiments of the present invention, having a single water wheel, in which the structures of FIGS. **1-26** can be used with this structure;

FIG. **28** is a longitudinal sectional view of a water exit valve, this structure can also be used with the structures of FIGS. **1-27**;

FIG. **29** is an extended mechanism which can be used with the structures of FIGS. **1-28**, and **30-33**;

FIG. **30** is another extended mechanism which can be used with the structures of FIGS. **1-29**, and **31-33**;

FIG. **31** is another extended mechanism which can be used with the structures of FIGS. **1-30**, and **32-33**;

FIG. **32** is yet another extended mechanism which can be used with the structures of FIGS. **1-31**; and

FIG. **33** is yet another extended mechanism which can be used with the structures of FIG. **1-32**.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIG. **1**, an air humidifier comprises a base **1**. An opening water tank **2** is integrated into the humidifier base **1**. A water inlet **8** is opening on the upper surface of the casing **111**. The inside of the base **1** is combined with the water tank **2** and an atomizing chamber **3**. The atomizing chamber **3** is composed of a water sub-tank **14**. The water tank **2** with the atomizing chamber **3** and sub-water tank **14** are provided with the base **1**. A water level control board **13** and the bottom of the water tank **2** form a first chamber **15**. A water opening **4** is provided at the bottom of the water tank **2**. A water level control board **13** is provided with a water exit valve **12** corresponding to the water opening **4**. The water exit valve **12** is provided for controlling the flow rate and on/off of the water flow downwardly from the water tank **2** through the water sub-tank **14**. On the water sub-tank **14** is provided with the atomization device **5** and an automatic breaker **26**. The atomization device **5** can be an ultrasonic device or a heater or filter for transforming water into vapor. A fan **6** is installed on the base **1**. A first vapor opening **7** is provided on the upper surface of the casing **111**.

FIG. **2** shown an air guide **304** with an air opening **308** and an air inlet **307** is provided on the water sub-tank **14**. When the humidifier is turned on, the opening water tank **2** is filled with water, the water can flow through the water opening **4** into the water sub-tank **14**. The atomization device **5** generates vapor with an ultrasonic device or a heater. The fan **6** on the bottom of the base **1**, sucks air from the space under the fan **6** upwardly, forces the air to go through the first air guide tube **304** from air inlet **307**, toward the air opening **308** to exit through the first vapor opening **7**. The first air guide tube **304** is connected with water sub-tank **14**. A protect cover **310** cover the air opening **308** to avoid the water flow into the air opening **308** when the ultrasonic device generates the vapor.

FIG. **3** shows the humidifier base **1** is disposed with a layer of a first ornament **9**. The first ornament **9** is annular and connected in outside of the base **1**. Inside the first ornament **9** is disposed with a second air guide tube **11**, which is connected with the first vapor opening **7** and which is used for a second vapor opening **10** that is disposed on the first ornament **9**. The fan **6** sucks air from the base **1** forces the air to go through the first air guide tube **304** from air inlet **307**, toward the air opening **308** to exit through the first vapor opening **7** and go through the second air guide tube **11**, toward the second vapor opening **10**. The second air guide tube **11** should be longer than the height of the base **1**, or the second vapor opening **10** should be higher than the first vapor opening **7** by at least half or same height of the casing **111** to keep enough

vapor for best effect and make the whole design more valuable. The cover **310** can be combined with the first ornament **9**, which includes the second air guide tube **11**, the second vapor opening **10**, and the first vapor opening **7**, which are all shared in one component. It is easy to take out cover **310** to refill water or for cleaning. The water tank **2** is combined with water sub-tank **14** to form a single component. FIG. **1**, FIG. **2** and FIG. **8** to FIG. **33** can be used in this embodiment.

FIG. **4**, FIG. **5** and FIG. **7** shows the upper surface of the casing **111** is provided with a water barrier **16**. The water barrier **16** and the upper surface of the casing **111** form a second water sub-tank **17**. The second water sub-tank **17** is connected with the water tank **2** via the water inlet **8**. The second water sub-tank **17** will help create more capacity for water tank **2** and also easy to refill water. The second sub-tank **17** can be integrated with the water tank **2** and use the same water inlet **8**. The humidifier base **1** is provided with a water pump **18**. One end of the water pump **18** is connected with the water tank **2** through the water outlet pipe **519** and the other end is connected with a first water outlet **20** via a first water outlet pipe **19** in the first ornament **9**. When water is pumped though the first water outlet pipe **19** and flows out of the first water outlet **20**, the water will flow back to the water tank **2** via the water inlet **8**. The water pump **18** can suck water though the second water outlet pipe **519** to move the second ornament **128**. The water flows out of the first water outlet **20** can also move the second ornament **128**. The first water outlet **20** should be higher than the first vapor opening **7** or water inlet **8** by more than half or same height of the casing **111** to make vapor and anion from the waterfall. A power source **506** can also be disposed on the humidifier base **1**. The power source **506** drives a shaft **507** to move the second ornament **128** or can be used with an extension mechanism. The cover **310** can be combined with the first ornament **9**, which includes the second air guide tube **11**, the second vapor opening **10**, and the first vapor opening **7**, which are all shared in one component. The cover **310** can also be combined with the first ornament **9**, which includes the first water outlet pipe **19**, and the first water outlet **20** which are all shared in one component. FIG. **1** to FIG. **3** and FIG. **8** to FIG. **33** can be used in this embodiment.

FIG. **6** shows first ornament **9** is in a two-layer structure, which is in an 8-shaped structure composed of two annular structures. The first water outlet **20** is at the lower end of the upper annular structure and connected with the water pump **18** via the water outlet pipe **19**. A third water sub-tank **28** is disposed beneath the first water outlet **20** where the lower annular structure is located. The third water sub-tank **28** is arranged with a water recycling port **21**. The lower annular structure is arranged with a second water outlet **27**. The water recycling port **21** is connected with the second water outlet **27** or the water tank **2** via a water recycling pipe **22**. FIG. **1** to FIG. **5** and FIG. **8** to FIG. **33** can be used in this embodiment.

FIG. **10** illustrates another decoration that can be attached to the humidifier, and FIGS. **8-9** illustrate two moving mechanisms used with the decoration of FIG. **10**. The moving mechanisms shown in FIGS. **8-9** include mainly a coil **332**, **336**; a magnet **333**, **337**; a shaft **339**, **331**; a rocking arm **334**, **338**; a rocking rode **335**, **340**; and a fastening frame **341**, **342** when the coil **332**, **336** is energized, a magnetic force is generated, the rocking rod **335**, **340** moves back and forth, thus the rocking arm **334**, **338** moves therewith. This makes an arm **330** in FIG. **10** moves back and forth. Numeral **329** in FIG. **10** designates a vapor exit from which a vapor can exit.

The mechanisms shown in FIG. **8-10** can also be used with other embodiments shown in FIGS. **1-7**, **31-33** of this invention.

FIGS. **11-26** have basically been shown in a U.S. Pat. No. 6,978,564 (hereinafter designated as '564) invented by the same inventor as that of the present invention. FIGS. **11**, **12**, . . . , **25**, and **26** illustrate a first, second, . . . , fifteenth, and sixteenth subassembly, respectively, that can be used with the embodiments shown in FIGS. **1-7**.

FIG. **11** basically is the same as FIG. 1 of '564, but without the musical box and relevant parts shown on the left side thereof. In FIG. **11** the first magnets **104**A and the second magnets **104**B are for transmitting a movement from a power source from under a stopper member **106** to over the stopper member. A first rotary member **103**, a second rotary member **107**, a connecting member **105**, and a lid **101** can further be provided. The first magnets **104**A are installed in the first rotary member **103**, the second magnets **104**B are installed in the second rotary member **107**, the connecting member **105** is fastened to the stopper member **106** and is provided for rotatably accommodating the first rotary member **103**, the lid **101** is installed on the connecting member **105** for preventing the first rotary member **103** from falling off. The stopper member **106** can be provided with a first recessed portion **146** for accommodating the first rotary member **103** and the connecting member **105**, and a second recessed portion **147** for accommodating the second rotary member **107**.

The second rotary member **107** is fastened to the rotary piece **109** so as to rotate therewith. A socket member **108** which can be fastened to the stopper member **106** is for accommodating the second rotary member **107** so as to confine or stabilize the movement of the second rotary member **107**. Numeral **102** designates a support on which a figurine or a subassembly can be positioned.

A rotary coupler **112** provided with the rotary piece **109** can be engaged with the shaft **507** of FIG. **7** or other embodiments so that the subassembly shown in FIG. **11** can be in the water receptacle **2**. The stopper member **106** can be rubber, metal, plastic or other suitable material.

FIG. **12** is the same as FIG. 4 of '564 but without the musical box and relevant parts. In FIG. **12**, the subassembly has a decorative base member **116**, a transparent housing **117**, at least a first magnet **104**A, and at least a second magnet **104**B, at least one vane **118** fastened to the first magnet **104**A for agitating some particles in the transparent housing **117** so that it looks like some flurries are moved upwardly and falling down. A lid **101** for installing the vane **118** and the magnet **104**A; and another lid **119** provided to prevent the vane **118** and the magnet **104**A falling off. This subassembly can be connected to the shaft **507** in FIG. **7** and can work with other embodiments and be inside of the water receptacle **2**.

FIG. **13** is the same as FIG. 5 of '564, in which the subassembly includes a rotary member **148** and a magnet **104**A positioned in a lid **101**; and a lid **149** covering the lid **101**, the rotary member **148**, and the magnet **104**A and has an opening so that the particles agitated by the rotary member **148** can exit. This subassembly can be connected to the shaft **507** in FIG. **7** and can work with other embodiments and be inside of the water receptacle **2**.

Please note that the subassemblies shown in FIGS. **8-33** not only be inside of the water receptacle **2**, but also be outside of the water receptacle **2**.

FIG. **14** is the same as FIG. 7 of '564, in which a gear **294** over a lid **293** is connected with the shaft **307** or **316** shown in FIGS. **1-4**, two gears **296**A and **296**B are located engageable with the gear **294**. The teeth of the gears **296**A and **296**B engage with teeth of a rotary cover **295**. The teeth of the rotary plate **295** are provided on the inside face of a vertical wall on the peripheral of the rotary cover **295**. When the shaft **307** or **316** rotates counterclockwisely, the gear **294** does the same,

and the gears **296**A and **296**B, and the rotary cover **295** rotate clockwisely, and vice versa. A gear **297** can be fastened to the gear **294** or the rotary cover **295** so as to drive other elements not shown in the drawings. We can also eliminate the gear **297** and have a figurine or decoration mounted on the rotary cover **295**. The subassembly shown in FIG. **14** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **15** is the same as FIG. 8 of '564, in which a gear **120** on a lid **101** can be connected with the shaft **507** shown in the FIG. **7**. A connecting piece **131** is fastened to the gear **120** and is fixed with a rotary shaft **127** which is installed with a canopy **128**. A housing **129** is provided around the shaft **127** indirectly (with a tube **150** in between) to stabilize the rotation of the shaft. The purpose of the tube **150** is to protect the shaft **127**. A plate **130** is positioned around the shaft **127** for supporting some decoration (not shown in the drawings). Another gear **121** is engaged with the gear **120** and fastened with a wheel **124** which has an elongate drive stub **124**A. A housing **122** is fixed to the lid **101** and is provided around the wheel **124**. Another rotary shaft **132**A and two guiding rods **125**A and **125**B are vertically inserted through the housing **122**. A link **123** with a longitudinal slot **123**A is fastened to the lower end of the rotary shaft **132**A. A figurine (horse) **126**A is fastened to the upper part of the rotary shaft **132**A. The elongate drive stub **124**A is movably located in the longitudinal slot **123**A. The rotation of the gear **120** causes the rotation of the gear **121** and the wheel **124**, which in turn causes the up and down movement of the link **123**, the shaft **132**A, the guiding rods **125**A and **125**B, and the horse **126**A. The subassembly shown in FIG. **15** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **16** is the same as FIG. 9 of '564, in which a gear **120'** on a lid **101** can be connected with the shaft **507** shown in FIG. **7**. Another gear **121** is engaged with the gear **120** and fastened with a wheel **124** which has an elongate drive stub **124**A. A housing **122** is fixed to the lid **101** and is provided around the wheel **124**. Another rotary shaft **132**A and two guiding rods **125**A and **125**B are vertically inserted through the housing **122**. A link **123** with a longitudinal slot **123**A is fastened to the lower end of the rotary shaft **132**A. A figurine (horse) **126**A is fastened to the upper part of the rotary shaft **132**A. The elongate drive stub **124**A is movably located in the longitudinal slot **123**A. The rotation of the gear **120** causes the rotation of the gear **121** and the wheel **124**, which in turn causes the up and down movement of the link **123**, the shaft **132**A, the guiding rods **125**A and **125**B, and the horse **126**A. The subassembly shown in FIG. **16** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **17** is the same as FIG. 10 of '564, in which a gear **120** over a lid **101** can be connected with the shaft **507** shown in FIG. **7**. Two other gears **121** and **121'** are engaged with the gear **120** and fastened with wheels **124** and **124'**, respectively, which have elongate drive stubs **124**A and **124**A' respectively. Housings **122** and **122**A are fixed to the lid **101** and are provided around the wheels **124** and **124'** respectively. Rotary shafts **132**A and **132**B and two pairs of guiding rods **125**A, **125**B, and **125**A', **125**B' are inserted through the housings **122** and **122**A respectively. A plate **130** is provided around the shafts **132**A and **132**B for supporting some decoration (not shown in the drawings). Links **123** and **123'** with longitudinal slots **123**A and **123**A' respectively are fastened to the lower end of the rotary shafts **132**A and **132**B respectively. The elongate drive stubs **124**A and **124**A' are movably located in the longitudinal slots **123**A and **123**A' respectively. The rotation of the gear **120** causes the rotation of the gears **121** and **121'** and the wheels **124** and **124'**, which in turn causes the up and down movement of the links **123** and **123'**, the shafts **132**A and **132**B, the guiding rods **125**A, **125**B, **125**A' and **125**B', and the horses **126**A and **126**B. Decoration plates **133** and **133'** are employed to cover a side of the housings **122** and **122**A respectively. The subassembly shown in FIG. **17** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **18** is the same as FIG. 11 of '564, in which a gear **120** over a lid **101** can be connected with the shaft **507** shown in FIG. **7**. FIG. **18** differs from FIG. **17** in that a connecting piece **131** is fixed to the gear **120** and is fastened with a rotary shaft **127** which is protected with a tube **150** and which is fastened with a canopy **128** on its top end. That is to say, all of the elements shown in FIG. **18**, except the connecting piece **131**, the rotary shaft **127**, the tube **150**, and the canopy **128**, can also be exactly the same as the third embodiment shown in FIG. **17**, instead of those shown in FIG. **18**. In FIG. **18**, one housing **122** is employed to replace the two housings **122** and **122**A shown in FIG. **17**. Links **134** are fastened to the lower ends of the shafts **132**A and **132**B respectively for being moved by the elongate drive stubs **124**A and **124**A, respectively. Two connecting pieces **135** are employed for installing the wheels **124**, **124'** and the gears **121**, respectively. The subassembly shown in FIG. **18** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **19** is the same as FIG. 12 of '564, in which a gear **120** can be connected with the shaft **507** shown in FIG. **7**. The subassembly shown in FIG. **19** is very similar to the fourth embodiment (FIG. **18**) of the subassembly. In FIG. **19**, there are four rotary shafts **132**A, **132**B, **132**C, **132**D for installing four horses **126**A, **126**B, **126**C, **126**D respectively. Four housings **122**A, **122**B, **122**C, **122**D are provided around the four rotary shafts **132**A, **132**B, **132**C, **132**D respectively. A rotary shaft **127** is installed on a bearing **120** and is fastened with a canopy **128**. The subassembly shown in FIG. **19** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIGS. **20** and **21** are the same as FIGS. 13 and 14 of '564, in which a gear **120"** over a lid **101** can be connected with the shaft **507** shown in FIG. **7**. A housing **122**E can be fastened to the lid **101**. A support tube **139** is provided on the housing **122**E, for rotatably supporting a shaft **141**. A wheel **136** and a gear **171** (which is engageable with the gear **120"**) are fixed on the shaft **144**. An elongate drive stub **137** is provided on the wheel **136**. The stub **137** can be inserted through a hole provided on a rod **172** on which a figurine or a decoration can be fixed. A ring **138** and a fastening piece **140** are fixed to the stub **137** and the end of the shaft **141**, respectively. When the gear **120"** rotates, the gear **171** and the wheel **136** rotate, thus in turn the stub **137** causes the rod **172** to do reciprocating movement. The subassembly shown in FIGS. **20** and **21** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **22** is the same as FIG. 15 of '564, in which a gear **120"** over a lid **101** can be connected with the shaft **507** shown in FIG. **7**. A housing **122**F can be fastened to the lid **101**. Two support tubes **144** and **145** can be formed on the housing **122**F, for rotatably supporting shafts **141** and **143**. A wheel **136** and a gear **171** (which is engageable with the gear **120"**) are fixed on one side of the shaft housing **122**F **141**. Another wheel **136'** is fixed in the other side of the shaft **141**. The wheels **136** are **136'** are provided with elongate drive stubs **137** and **137'**, respectively. Connecting pieces **142** and **142'** are fixed to the two ends of the shaft **141**, respectively. Lon-

gitudinal slot **176'** and **176"**, in which the elongate drive stubs **137** and **137'** can slide respectively, are formed on the connecting pieces **142** and **142'**, respectively. Figurines or decorations can be positioned on the connecting pieces **142** and **142'**. A plate **130** is provided for supporting figurines or decorations. When the gear **120"** rotates, the gear **171**, the shaft **141**, and the wheels **136** and **136'** rotates therewith, thus in turn causes the connecting pieces **142** and **142'** to do reciprocating movement. The subassembly shown in FIG. **22** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **23** is the same as FIG. 16 of '564, in which a gear **128"** over a lid **101** can be connected with the shaft **507** shown in FIG. **7**. A rod **175** is fixed on the lid **101**. A gear **171'** and a wheel **136"** having a through hole in the central portion thereof respectively are rotatably installed on the rod **175**. The gear **171'** is engageable with the gear **120"**. An elongate drive stub **137"** is formed on the wheel **136"**. A connecting piece **142"**, on which a figurine or decoration can be fixed, is rotatably installed on top of the gear **120"**. The connecting piece **142"** is formed with a longitudinal slot **176** in which the elongate drive stub **137"** can slide. A lid **177** is positioned over connecting piece **142"** for confining the movement of the connecting piece **142"**. When the gear **120"** rotates, the gear **171'**, and the wheel **136"** rotate, thus in turn causes a reciprocate movement of the connecting piece **142"**. The subassembly shown in FIG. **23** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **24** is the same as FIG. 17 of '564, in which a wheel **178** having an elongate drive stub **179** can be connected with the shaft **507** shown in FIG. **7**. A plurality of tubes **193**, **191**, **180** having a longitudinal slot **195** is fixed with a tube **216** having a hole **185** and a gear plate **181**. A tube **183** having a hole **184** is fixed with a gear plate **182**. The elongate drive stub **179** is located in the longitudinal slot **195** and slideable therein when the wheel **178** rotates. A cover plate **186** is positioned on the lid **101'"** and is provided with holes **194**, **190** and **190'**. The upper ends of the tubes **193** are fastened at the holes **194** of the cover plate **186**. Two supports **188** and **188'** for supporting figurines or decorations thereon are fixed with rods **215** and **215'** respectively. The rods **215** and **215'** are inserted through the holes **190** and **190'** respectively, and fastened in the holes **185** and **184** of the tubes **216** and **183** respectively. The tubes **216** and **183** are rotatably installed in the tubes **191** and **191'** respectively. When the wheel **178** rotates, the elongate drive stub **179** drives the moving piece **180**, the tube **216** and the gear plate **181** which engages with the gear plate **182** to reciprocate. Thus this causes the gear plate **182**, the tube **183**, the rods **215** and **215'**, and the supports **188** and **188'** to reciprocate. The subassembly shown in FIG. **24** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **25** is the same as FIG. 18 of '564, in which a wheel **178'** having an elongate drive stub **179'** can be connected with the shaft **507** shown in FIG. **7**. A plurality of tubes **193'**, **196**A, **196**B, **196**C, and **196**D are provided on the lid. Rotary tubes **197**A, **197**B, **197**C, and **197**D are rotatably installed in the tubes **196**A, **196**B, **196**C, and **196**D respectively, and fastened with connecting pieces **199**A, **199**B, **199**C, and **199**D respectively, which are provided with longitudinal slots **200**A, **200**B, **200**C, and **200**D respectively. The elongate drive stub **179'** can be inserted into the longitudinal slots **200**A, **200**B, **200**C, and **200**D and slide therein when the wheel **178'** rotates. A cover plate **186'** is positioned on the lid **202** and is provided with holes **218**, **218'**, **201**A, **201**B, **201**C, and **201**D. Supports **198**A, **198**B, **198**C, and **198**D for supporting figurines or decorations thereon are fastened with rods **217**A, **217**B, **217**C, and **217**D respectively, which insert through the holes **201**A, **201**B, **201**C, and **201**D on the cover plate **186'** respectively, and installed in the rotary tubes **197**A, **197**B, **197**C, and **197**D respectively. When the wheel **178'** rotates, the elongate drive stub **179'** drives the connecting pieces **199**A, **199**B, **199**C, and **199**D to reciprocate, and the rotary tubes **197**A, **197**B, **197**C, and **197**D to rotate, respectively. Thus the rods **217**A, **217**B, **217**C, and **217**D, and supports **198**A, **198**B, **198**C, and **198**D rotate respectively. The cover plate **186'** is fastened to the upper ends of the tubes **193'** at the holes **218** and **218'**. The movement of the connecting pieces **199**A, **199**B, **199**C, and **199**D does not interfere with each other because they are on different heights (levels). The subassembly shown in FIG. **25** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

FIG. **26** is the same as FIG. 19 of '564, in which a gear **204** can be connected with the shaft **507** shown in FIG. **7**. A rod **219** and tubes **203** and **203'** are provided on the lid **202'**. A gear **221** and a wheel **210** having an elongate drive stub **214** are rotatably provided on the rod **219**. A gear **204** engageable with the gear **221** can be installed on a rotary rod **219** and tubes **103** (FIG. **1**) and rotate therewith. A rotary tube **212** is fixed with a gear plate **213** which is engageable with a gear plate **213'** fixed with a rotary tube **212'**. A moving piece and a longitudinal slot (in which the elongate drive stub **214** slides) similar to the moving piece **180** and the longitudinal slot **195** shown in FIG. **17** are provided under the gear plate **213** and fixed to the rotary tube **212**. Supports **211** and **211'** for supporting figurines or decorations having rods **222** and **222'** are fastened to the rotary tubes **212** and **212'** respectively, with the rods **222** and **222'** inserted into the tubes **212** and **212'** respectively. When the wheel **210** rotates, the stub **214** drives the tubes **212** and **212'**, the gear plates **213**, and **213'**, and the supports **211**, and **211'** to move. A housing **209** is fastened to the lid **202'**, with a rotary shaft **132** provided therethrough. A gear **205** (engageable with the gear **204**) and a wheel with an elongate drive stub (not shown in the drawing) (similar to the gear **121** and wheel **124** with an elongate drive stub **124**A in FIG. **8**) can be installed on the housing **209**. A link with a longitudinal slot (not shown in the drawing) (similar to the link **123** with the longitudinal slot **123**A in FIG. **8**) can be fixed to the lower end of the shaft **125**. When the wheel **205** rotates, the shaft **132** and the horse **126** move upwardly and downwardly. Another housing **220** is fastened to the lid **202'** with a gear **206** rotatably installed on it. The gear **206** is engageable with the gear **204**. The inside structure of the housing **220** is similar to that shown in FIGS. **13** and **14** (i.e., a wheel with an elongate drive stub not shown in the drawing is fastened to the gear **206**). A connecting piece **207** having a longitudinal slot **223** is rotatably installed on a shaft **208**. The elongate drive stub in the housing **220** is located in the longitudinal slot **223** and can slide thereon. A figurine or a decoration can be fastened to the connecting piece **207**. When the gear **206** rotates, the wheel rotates, the stub drives the connecting piece **207** to reciprocate. The subassembly shown in FIG. **26** can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **2**.

The inventor of the present invention also has the following twelve U.S. patents granted: U.S. Pat. Nos. 5,078,386; 5,088,373; 5,070,753; 5,286,535; 4,890,828; 5,203,743; 4,987,787; 6,978,564, 4,939,944; 5,448,007; 5,081,899; and 5,163,878. These patents can be used with the structures of FIGS. **1-7**, **31-33** of the present invention.

FIG. **27** shows seat **533** of the embodiments in the present invention. A water wheel **529** is provided in the water sub-

receptacle **503**. When the fan **501** is turned on, wind blows from the wind inlet **531**, toward the water and water wheel **529** in the water sub-receptacle **503** so that the water wheel **529** rotates and the water in the water sub-receptacle **503** moves, so as to clean the air. The number of the water wheel **529** can be one or more than one. The structures shown in FIGS. **1-7** and **31-33** also can be used with this structure.

FIG. **28** shows a sectional view of the water exit valve **12** in FIGS. **2-7**, A hollow rod-shaped structure **5581** is provided in an outer housing **558** which has a larger diameter than that of the hollow rod-shaped structure **5581**. The hollow rod-shaped structure **5581** is provided with a horizontal rod **5582** which in turn is provided with a communication hole **563** in which an abutment rod **581** is provided. A conical shaped retaining head **559** is provided on the top of the abutment rod **561** which is surrounded with a spring **560** on the lower portion thereof. One end of the spring **560** abuts against the hollow rod-shaped structure **5581**, the other end of the spring **560** abuts against the bottom of the abutment rod **561**. A soft stopper (which can be made of rubber, plastic, or other suitable material) **562** is provided under and around the conical shaped retaining head **559**. The soft stopper **562** is of a shape similar to a bowl, with a lower edge abuts against the hollow rod-shaped structure **5581**. When in use, the outer housing **558** is fit to the water receptacle at the water exit **4**.

FIGS. **29-30** show two extended mechanisms of the present invention. These two mechanisms also can be used with the structures shown in FIGS. **1-7**, and **31-33**.

As shown in FIG. **29**, a light **509** is provided in the water receptacle **2315**. A decoration **2345** is provided outside of the light **509**. A transmission mechanism **512** (which can be connected to the shaft **507** of FIG. **7**) is provided on the decoration **2345** so as to move the latter.

As shown in FIG. **30**, two transmission mechanisms **512** (which can be of the shape of two rollers and one of them can be connected to the shaft **507** of FIG. **7**) is provided in the decoration **2345**. A light **509** is provided in the middle of the decoration **2345**. When in use, as shown in FIGS. **29-30**, the light **509** illuminates the pictures on the decoration **2345** so as to produce a visual effect which is an extra effect of the decorative humidifier of the present invention which can purify the air, humidify the air, and deliver the wind.

As shown in FIG. **31**, a water receptacle **2315** is provided on the base land is provided with a plurality of second holes **516** (at its bottom) which in turn is connected with a pump **18** shown in FIGS. **4-7**. A plurality of decorations **2345** are provided and are suspended (floated) in the water receptacle **2315**. The pump **18** (in FIGS. **5-7**) can pump air or can be a making water bubbles device to pumps water bubbles, through the second holes **516** in the bottom of the water receptacle **2315**, the water bubbles in the water receptacle **2315** pushes the decorations **2345** (e.g. a plurality of fishes) upwardly, which in turn sink downwardly (because of their own weights) toward the bottom of the water receptacle **2315**. Thus the decorations **2345** can repeatedly move upwardly and downwardly enhance the visual effects, which is an extra effect of the decorative humidifier of the present invention which can purify the air, humidify the air, and deliver the wind. FIGS. **29-30** can also serve as a background picture in this mechanism. The structures in FIGS. **1-30** can be used with this mechanism.

As shown in FIG. **32**, a water receptacle **2315** is provided on the base **1** and is provided with a third water exit **520** and a first water inlet **519** at its bottom a vane (fan) **118** shown in FIG. **12** (or fan **148** in FIG. **13**) or water pump **18** connects with the first water inlet **519**. A plurality of decorations (in the shapes of jelly fishes) are provided and are suspended (floated) in the water receptacle **2315**. When the van **118** or fan **148** move, or the water pump **540** pumps water into the water receptacle **2315** through the first water inlet **519**, the water enters the support seat **533** through the third water exit **520**. Thus the water can circulate between the water receptacle **2315** and the support seat **533**, so that the decorations **2345** can move upwardly and downwardly repeatedly. A light not shown in the drawings can also be provided to enhance the visual effects, which is an extra effect of the decorative humidifier of the present invention which can purify the air, humidify the air, and deliver wind. FIGS. **29-30** can also serve as a background picture in this mechanism. The structure in FIGS. **1-30** can also be used with this mechanism.

As shown in FIG. **33**, a first magnetic device **521** is provided on the bottom of the water receptacle **2315** which in turn is provided on the base **1**. A plurality of decorations **2345** are provided and are suspended (floated) in the water receptacle **2315**. The decorations are provided with a second magnetic device **3452** respectively. When the first magnet device **521** is energized, the magnetic force thereof exerts a pushing force against the second magnetic devices **3452** (because of same polarity therewith) in the decorations **2345**, so that the decorations **2345** are prevented from sinking to the bottom of the water receptacle **2315**, and can move around in the water receptacle **2315**. Each of the decorations are of different weights and therefore will move around at different heights in the water receptacle **2315**. FIGS. **29-30** can serve also as a background picture in this mechanism. The structures **1-30** can also be used with this mechanism.

The foregoing description is provided for illustrative purposes only and should not be construed as any way limiting this invention, the scope of which is defined solely by the appended claims.

The invention claimed is:

1. An air humidifier comprising a water receptacle, a fan, a device for transforming water into vapor, an air humidifier base cover, wherein the outside of an air humidifier base cover is connected with at least one ornament, wherein the air humidifier base cover to combine with the ornament, and wherein the ornament includes an air guide tube, a first vapor opening and a second vapor opening, wherein the second vapor guide is connecting with the first vapor opening.

2. The air humidifier of claim **1**, further comprising a device to making air bubbles.

3. The air humidifier of claim **1**, further comprising at least one magnet or magnetic device.

4. The air humidifier of claim **1**, further comprising a shaft.

5. The air humidifier of claim **1**, further comprising a pump.

6. An air humidifier comprising a base, wherein the outside of base is connected with at least one ornament, wherein the base includes a water receptacle, a fan, and a device for transforming water into vapor, wherein the ornament includes a second air guide tube, first vapor opening and a second vapor opening, wherein the second vapor opening in the ornament is higher than the first vapor opening by at least half of the height of the base.

7. The air humidifier of claim **6**, further comprising a device to making air bubbles.

8. The air humidifier of claim **6**, further comprising at least one magnet or magnetic device.

9. The air humidifier of claim **6**, further comprising a shaft.

10. The air humidifier of claim **6**, further comprising a pump.

11. An air humidifier comprises including a base, the base including a water receptacle, a fan, a pump, the base is provided with a water barrier and the upper surface of the casing

to form a second water sub-tank; the second water sub-tank is connected with a water tank via a water inlet.

12. The air humidifier of claim **11**, further comprising at least one magnet or magnetic drive.

13. The air humidifier of claim **11**, further comprising a device to making water bubbles.

14. The air humidifier of claim **11**, further comprising a shaft.

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